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## Pandemics and the city

*Articles from the Manchester Urban Institute*

Mitlin, Diana; Martin, Michael; Deas, Iain ; Hincks, Stephen; Mell, Ian; Haughton, Graham; Pinto, Nuno; White, Iain ; Evans, James; Topping, Dave ; Bannan, Tom ; Rees, Joe; Murabito, Ettore; Gledson, Ann; Harrison, Matthew

*Publication date:*  
2020

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Mitlin, D., Martin, M., Deas, I., Hincks, S., Mell, I., Haughton, G., Pinto, N., White, I., Evans, J., Topping, D., Bannan, T., Rees, J., Murabito, E., Gledson, A., & Harrison, M. (2020, Apr). Pandemics and the city: Articles from the Manchester Urban Institute. Manchester Urban Institute.

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Volume One | April 2020

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# Dealing with COVID-19 in the towns and cities of the global South

Diana Mitlin

The global spread of COVID-19 poses particular risks for the one billion people living in informal urban settlements in the global South. A range of factors make transition of the virus more likely and strategies to tackle it extremely difficult to implement.

Despite these challenges, this is an opportunity to forge new partnerships between agencies that – if they work together – can reach the populations in need.

## High residential densities, with limited services

In informal settlements across the global South it is common for families of 2-5 people to live in a single room shack or tenement block of about 3 metres by 4 metres. Shacks are often adjacent to each other with a single water tap and pit latrine shared between 5-10 families. There is very limited public space for roads and pathways. The average population density of 'slums' in Nairobi was 28,200 people per square kilometre in 2009, a 51% increase in just ten years. One large high-density informal settlement (Mukuru) has a population density of 108,128 people per square kilometre. This makes it likely that the virus will spread rapidly.

Water supplies may be limited both because of the cost and because there is no access to piped water within the dwelling or even the plot. In sub-Saharan Africa, access in urban areas to piped water on the premises declined between 1990 and 2015. And even when supplies are available, they are frequently intermittent in lower-income areas, and they are frequently not affordable in the quantities required for good health. The WHO recommend 50 litres per person per day in non-emergency situations. This lack of water makes it hard for frequent hand washing to take place.

## Incomes are very low and savings non-existent

Most of the one billion people living in informal settlements have very little savings and nearly all work in the informal economy, often as employees in informal enterprises or as micro-entrepreneurs such as those selling vegetables. A small proportion have low paid jobs in the formal economy such as cleaners, factory workers and guards. Some of these households will be able to secure food from their extended family networks in rural areas but many will not. Increased use of food from rural areas will require more movement and potentially spread the disease.

It is extremely difficult for these workers to self-isolate; there is every likelihood they will carry on working.

## Many occupations are high risk

In addition to the considerable risks related to homes and neighbourhoods, many residents work in high risk occupations. One example are waste recyclers and others working in waste-related industry. There are also those who are paid to work in formal enterprises as cleaners and who are employed as domestic servants in higher-income neighbourhoods. There may also be those who are teachers and nurses and who are exposed to large numbers of people. Then there are the shop keepers and stall holders who have a constant interaction, generally through cash, with many local people.

## A lack of affordable health services

Formal health services are rare in most informal settlements. Even where these services do exist charges for medicine put them out of reach for many people. Households may supplement these services with informal providers either because they do not trust the quality and/or because costs are lower. In Mukuru (Nairobi), 100,500 households are served by 206 public and private (formal and informal) health facilities.

The most common reason for urban households to shift from just managing to chronic poverty is ill health. Health expenditures combined with the lack of income places severe strain on households.

**There is an urgent need for voluntary compliance with the required measures and that means we need to identify, support and share experiments in governance that are effective.**

## There is a looming economic crisis

The scale of economic recession will have impacts on the global South. Incomes will fall even for those who do not get sick with COVID-19. The Financial Times on the 22nd March summarise the current state of economies in the global North and record that restaurant bookings globally are running less than 95% of their total last year, retail activities in the UK, Sweden, the US and Italy are between 20 to 80% down. In China current power plant coal consumption is 30 per cent below its level on 1st Jan 2020.

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In many countries in the global South there is no adequate programme to address emergency needs.

### **What needs to happen?**

Despite these challenges, there is reason for optimism. Networks like SDI have been developing partnerships with local authorities to address development needs in informal settlements for many years.

### **There is an immediate need to:**

Monitor conditions in informal and formal neighbourhoods across the globe. As seen by this news from Rio, there is confusion and misinformation. SDI's KnowYourCity data collection programme already has much critical information and the systems in place to monitor regularly. As government agencies learn from local communities what is happening on the ground they will strengthen their relations with these groups, and help to build trust.

Identify high-risk locations and help those individuals who are not well to isolate. Provide them with access to emergency health services if required.

Identify high-risk occupations and begin to roll out health programmes. These groups are beginning to be organized and are reaching out to government. They need guidance and protection.

Establish effective partnerships between key stakeholders including organized citizens, national and international government agencies, who are responsible for providing finance to those in need, and who are responsible for providing essential services, and NGOs and professional agencies able to provide technical assistance. In cities like Bulawayo (Zimbabwe), organized communities are changing the way that local government thinks about informal neighbourhoods. In India, SDI's Indian Alliance transformed urban programming in some cities so that it was more effective in reaching local needs.

Establish reliable sources of information so that people can act effectively to reduce risk and protect lives.

Organized communities, local government and health ministries have to work together to identify and test solutions to this crisis.

Capacitate networks of community leaders (working both in neighbourhoods and specific sectors) to share information that they collect upwards to the responsible agencies and share key health messages downwards. Some general information is available at the [Arise Consortium](#)

[website](#). Local information translated into appropriate languages is now urgently needed. Muungano waWanavijiji in Kenya is just one of the networks of community organizations that are ready to help. Another is Abahlali baseMjondolo in Durban, South Africa.

### **Governance and the social contract are key**

At the heart of a humane progressive response will be a new relationship between citizens, their organizations and the state. In this context, the state includes local and national government and utilities. All have a critical role to play in responding to COVID-19.

In terms of the immediate health situation, many of the measures will be imposed on informal urban communities. There is a risk that there will be a coercive militarised response. However, that will not be enough to save lives. There is an urgent need for voluntary compliance with the required measures and that means we need to identify, support and share experiments in governance that are effective.

The experiences of networks like SDI is that trust can be built; there are many working in government who have a good understanding of the needs of those living in informal settlements and who understand the capabilities of community leaders. If trust is not established, misinformation and fear will cause many additional problems.

In Asia, the last financial crisis was associated with large numbers returning to their rural homes potentially spreading the virus to isolated areas with very few health services. There may be food riots as economic conditions worsen and considerable health risks from malnutrition.

We need to identify measures that help communities respond to the economic crisis, with assistance from social welfare departments and the humanitarian agencies. Once more, these interventions are far more effective if they work with organized communities who can help identify those most in need and help to develop approaches that build on existing capabilities and activities.

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This article first appeared on the [Global Development Institute website](#).





# Temporary urban solutions help us deal with crisis – and can lead to radical shifts in city space

Michael Martin, Iain Deas, Stephen Hincks

The coronavirus pandemic has resulted in new thinking about how cities are best organised to meet our needs. Part of this has involved short-term changes in the use of urban space.

In England, some planning regulations have been relaxed to allow buildings to be repurposed in response to the crisis. In Italy, there are proposals to convert shipping containers to intensive care units.

Our research into the temporary use of land and buildings shows the ways in which short-term development is deployed during times of crisis. Temporary uses also offer the opportunity for more fundamental rethinking of urban space in the longer term.

## Rapid response

Responding to COVID-19, temporary spaces are providing a way of quickly bolstering intensive care bed spaces as demand spirals. London's Nightingale hospital, in the remodelled ExCel conference venue, is one of a number of international examples of temporary field hospitals.

Temporary use may also help facilitate social distancing. Street closures in North America have been used to deter car use and increase space for pedestrians.

There are also more imaginative examples. In Bristol, residents have created an informal runners' lane to ensure safe passage between pedestrians and joggers in accordance with UK social distancing rules.

In Bogotá, curbs on car use have liberated space for the temporary expansion of the city's network of cycle paths, helping, in turn, to reduce overcrowding on public transport. Likewise, Germany has introduced extensions to pavement and bike lanes.

These measures are practical responses, reflecting changed priorities regarding urban infrastructure. But the history of temporary urbanism in response to crises shows that short-term repurposing can address other needs.

After the 2011 earthquake in Christchurch, New Zealand, a number of examples of tactical, temporary re-use of urban space emerged. Some – from an urban living room featuring a book exchange inside a recycled fridge to dance spaces on disused land with music from a converted washing machine – were about maintaining community spirit in the face of adversity.

Other temporary uses have responded to economic crises. In western cities after the global financial crisis, temporary re-use reflected landowners' desire to maintain income and the wish of political leaders to protect local economies. This logic informed the establishment of temporary businesses known as pop-up shops or the re-use of shipping containers for everything from urban agriculture to shopping malls.

These examples show the dynamic role temporary use of land and buildings can play in keeping cities functioning in the face of adversity.

In the current health crisis, there is scope for temporary solutions again to prove vital. Equally, these short-term expedient measures could have longer-term benefits, extending beyond the current crisis.

The reduction of traffic, extension of footpaths and installation of temporary cycle ways promotes new opportunities for play, health and sustainable mobility. As an example, play streets could radically alter urban childhoods for the better.

More immediately, these measures would provide an alternative lifeline for communities if parks and green spaces were to eventually close.

**The reduction of traffic, extension of footpaths and installation of temporary cycle ways promotes new opportunities for play, health and sustainable mobility. As an example, play streets could radically alter urban childhoods for the better.**



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## Learning from the past

Lessons from the 2007/08 financial crisis suggest that allowing innovative adaptations to continue when something approaching normality resumes will be a challenge.

In the aftermath of the global financial crisis, the number of innovative temporary uses doubled in major English cities. But when the wider economy recovered, many innovative temporary uses – including urban farms, beach bars and pop-up cinemas – were sacrificed in favour of business-as-usual development. Those that remained were sometimes co-opted by established corporate interests, often diluting their radical purpose.

Rather than encouraging new innovative or progressive uses of space, the deployment of mobile temporary use frequently served as a means to incentivise development by encouraging speculative private investment in previously unattractive locations.

With COVID-19, temporary uses might prove to be more lasting. This is partly because the scale of the health crisis requires adaptation beyond a few landmark developments. It may also require at least some element of social distancing to be maintained for a protracted period. Safe movement in and around cities may require temporary design solutions to become more permanent, or to be deployed again if this or a similar health crisis resurfaces.

In the longer term, the shape of urban living after coronavirus, and the extent to which it is different, remains uncertain. But previous crises suggest that at least some of the temporary uses currently emerging may well endure into the future.

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This article first appeared in [The Conversation](#).







# Whose park is it anyway? Social distancing and park users during the COVID-19 pandemic

Iain Mell

How should we react when we see people outside in public spaces or parks when we're all supposed to be at home self-isolating? When does our daily constitutional exercise turn into a group activity? Who are we allowed to spend time with outside of the home?

Each of these questions has been raised since the 23rd March when people in the UK were asked by the UK government to stay at home to help save lives by limiting the spread of the novel coronavirus COVID-19. However, due to the nature of [urban form](#): living arrangements, population density and working patterns, asking the population to stay indoors indefinitely, is being tested as people struggle to cope with an alternative way of living.

Since the lockdown announcement, the majority of the UK population has adhered effectively to the 2-metre social distancing requests when venturing outside. Yet there are a growing number of instances, spread via social and national media outlets, of people congregating in parks for picnics, playing football and using parks in a normal manner. This has caused consternation for many who see this as a blatant disregard for public health, and for the health of NHS staff and other key workers. In some cases, people may not be thinking about the wider implications of their contact with others, but the reporting of such instances is presented from a binary good/bad perspective that fails to unpack the complexities of use during a pandemic.

Green spaces also provide the setting for a number of people to use a space simultaneously whilst social distancing, a benefit often overlooked in media reporting. 3000 people in Brockwell Park may seem a lot but the 125-acre site can accommodate it.

However, first things first. Not all runners, walkers, cyclists, dog walkers, sunbathers, or families are flouting the rules on social distancing. [Most people](#) are being mindful of others, friendly and polite with it, and leaving the recommended 2-metre gap. However, a small percentage of park users are not. These are the people being demonised in the media. Some people may not care and some people may be showing caution to meet friends although it may be interpreted differently by others. Moreover, people may simply need to be outside with others to alleviate the sense of isolation and fatigue that comes with being indoors, in one place, for the majority of their day. What is clear is that the way we live our lives and the need for contact becomes more pressing when it is limited by law.

[Parks and green spaces](#) generally are critical to addressing these health and well-being issues. They help to alleviate stress, anxiety and depression, help our bodies function more effectively, help us to act more compassionately and less aggressively, and to undertake our work and caring responsibilities more effectively. Green spaces also provide the setting for a number of people to use a space simultaneously whilst social distancing, a benefit often overlooked in media reporting. 3000 people in [Brockwell Park](#) may seem a lot but the 125-acre site can accommodate it. Each of these factors is important when everyday life has been suspended and replaced by a moderated range of indoor and digital lifestyles. Such a shift, and the pace at which everyone had to adjust, is part of the response concerning how people are using outdoor spaces.

With gyms, schools, cinemas, work, restaurants and bars closed, parks and other green spaces are one of the few places other than our homes we are allowed to go. Therefore, a higher proportion of people are now engaging with nature, which is a benefit to our health and well-being. However, due to the increased mix of users, conflict, especially in terms of perceived spacing, can become complicated. For example, how many of us actually know what 2-metres looks like? In parks, this is amplified as people are sensitive to physical contact so are potentially more conservative with the understanding of space. Add in people running, cycling or walking dogs and you integrate a randomness to the situation that not everyone can appreciate. How fast is a jogger running, will the cyclist slow down, where's the dog going, and will that couple keep walking abreast or change to single file? It is within these situations that people are losing tolerance with others. Moreover, if we see people sitting on the grass or



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sunbathing we are becoming predisposed to react negatively as the media has labelled these activities dangerous. If that person is alone and in space are they causing a problem or is it an issue of perception?

As we continue with the lockdown the UK government is proposing more punitive measures to limit contact: no outside use of space for exercise. Local Authorities are already closing play areas in Glasgow and parks in London for fear of spreading COVID-19 further. If this were rolled out nationally it would be a travesty for individuals and for society as it would take away the only access to “outside” that many people have. It will also amplify the sense of isolation by withdrawing normalcy from society. A further impact may be the lowering of the current high value of parks, which are being discussed as “critical infrastructure” as they support social and ecological liveability. The Local Government Secretary, [Robert Jenrick](#) on the 18th April stated that ‘people need parks’ and local authorities had a duty to keep them open to keep fit and healthy.

The UK government though continue to view enforced social distancing as a mechanism to better police space using the policing and possible closure of parks as an example. Whilst this approach has merits to central and [local government](#) in its totality by limiting use it will not work. People will [continue to go outside](#) unless they are to be arrested, and it would be more meaningful to use park rangers, police officers or even trained community volunteers to guide users in their activities than to close parks and lose their benefits. Closures would explicitly limit the access of some parts of society, namely low income and many Black, Asian, and Minority Ethnic (BAME) communities from use. These communities as argued by [Dr Meredith Whitten](#), have more limited access to parks due to inequalities in housing and geographical location. Limiting the use of parks would, therefore, exacerbate the limits placed upon these communities.

As a regular park user and an academic researching the value of green spaces, I see the logic of closing parks to limit any ongoing behaviour deemed to increase the potential risk of spreading COVID-19. However, I also view parks as an essential coping strategy for the current time. Without parks or access to green space, people will become isolated. Zoom or Google Hangout cannot replace fresh air and a 30-minute walk to clear your head. Personally, I need to spend time outside to get some exercise or let the kids run

around for 10 minutes – I’m currently missing my tram-walk commute which is part of my daily exercise.

Parks are good for you and people are predominately self-aware of themselves and their surroundings to social distance. People are also realising the value of parks to their health and well-being, as are the government (for now). Shutting parks would make the situation worse, so with consideration for others and [if we try and work](#) within the parameters of the rules set for social distancing and group use of green spaces, we can all make use of parks and they can continue to support us through this unprecedented time.

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An earlier version of this article appeared in [The Conversation](#).







# How modelling can become a debate-support tool, not just a decision-support tool

Graham Haughton, Nuno Pinto and Iain White

- Initial responses to the COVID-19 outbreak demonstrate that different countries come to different decisions based on scientific modelling.
- One concern with the current scientific modelling the UK Government is using is that treating nations as a single space means that we still do not understand the reasons for how, where and when particular hotspots emerge within countries.
- If the UK incorporates spatial modelling along with local knowledge, we can help shift from the emergency response phase to better planning for future events.

Predictive risk models used to inform policy necessarily balance complexity with simplicity, grappling with data limitations and scientific uncertainty before being often reduced to simple messages to communicate findings to the public. In the current COVID-19 crisis, politicians around the world claim to be basing their decisions on 'the science', very much in the singular, effectively making claims on the authority inherent in science to help support what are inevitably political decisions. The outcry over the 'herd immunisation' theory that was initially discussed in relation to the UK response quickly revealed the political nature of science, as not only did other countries interpret their 'science' differently, but scientists quickly broke cover to challenge the assumptions involved. Very quickly other aspects of the modelling work relied on by the UK authorities generated scientific debate that carried over into the public arena, as the 'black box' of mathematical modelling was opened up and subject to critical debate about both the model and scientific practices. The singular 'science' of the early pandemic rapidly turned into a valuable global public discussion of alternative models, assumptions, and futures, and about the need for more transparency and greater openness in sharing data.

## How modelling tools can support debate

The underlying context here is that models are often viewed as expert-led 'decision-support tools', designed by objective scientists to inform politicians, much more so in times of emergency. However, their use in COVID-19 quickly evolved, such that they took on a valuable additional role as public 'debate-support tools', improving scientific literacy and enabling people to better understand future contagion risks. This latter approach takes modelling beyond providing evidence to support expert decisions, to instead fostering public debate around alternative policy

options and alternative models, and the value judgements underpinning them, never more clear than when New Zealand's Prime Minister declared that she had never considered 'herd immunity' and that the country's population would find it unacceptable, with Donald Trump similarly rejecting the idea. The value of using models to create new spaces for public dialogue is that they can help reveal flaws in logic, judgement, design and potential implementation, highlighting areas of disagreement whilst building consensus around the most desirable options, in the process stimulating political as well as scientific debate.

**The value of spatial modelling is it can help us understand more about why some areas, whether cities or neighbourhoods, have lower or higher levels of mortality than others.**

## Incorporating spatial variation

In short, what we have seen in COVID-19 is how mathematical models quickly morphed from decision-support to debate-support, and from the province of elite experts to being discussed in households around the world. We want to argue that we can go much further however; by combining a wider range of data and giving spatial expression to this we can help shift from the emergency response phase to better planning for future events. In particular, there are important opportunities for how we collect, analyse and represent data in the future.

At the moment, most of the modelling work presented to the public has drawn on mathematical modelling and by now familiar versions of graphs revealing actual and expected exponential growth curves, including variants of 'flattening the curve' of the epidemic peaks to levels health systems can cope with. These have proven very effective as simple visual representations of the limited data available and the need for clear public messaging. However, despite the complex modelling behind them, these diagrams still simplify reality. For instance, treating nations as a single space means that we still do not understand the reasons for how, where and when particular hotspots emerge within

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nations, as the disease spreads unevenly in a process that is likely to require increasingly locally tailored policy interventions. Particularly once the current round of national restrictions starts to be rolled-back and more widespread testing undertaken we might reasonably expect to see much more localised responses to future outbreaks and for this we need local data to be released quickly to the wider modelling community, particularly spatial modellers.

As the pandemic progresses and large-scale population testing of exposure is rolled-out, we can and must do more, and it is here that spatial modelling and mapping can help. Thanks to advances in geographical information systems (GIS) and open source software and data, intelligible models and maps can be quickly produced, refined and updated; used well they can be powerful tools for both analysis and public communication, but used poorly they can cause resentment or a backlash, as has sometimes happened with hazard maps for coastal retreat or flooding.

### **The importance of including local knowledge**

Releasing finer-grained data around the spread of COVID-19 could allow modellers to develop a better understanding of factors that might contribute to controlling the spread of the disease without falling into too much aggregation or, worse, lack of transparency. For instance, detailed location data from smart phones have helped Singapore and South Korea to maintain a very low initial growth in cases, not without loss of privacy. But it will also help if we can build into our models a wider range of data sources. In Germany, Heinsberg, one of the hardest hit areas, has been adopted for a study collecting a very wide range of data to improve understanding of how the virus spreads across space and different social groups. There is a further step needed, however, of ensuring that the results of the modelling are presented effectively to local populations and experts so that they can help ground-truth the results, checking them against their local knowledge and lived experiences. This is one of the lessons we learn from flood risk mapping: computer modelling has vastly improved our understanding of large-scale catchment dynamics, but sometimes causes public anxiety when poorly communicated or perceived to be at odds with local knowledge.

The value of spatial modelling is it can help us understand more about why some areas, whether cities or neighbourhoods, have lower or higher levels of mortality

than others. However, to avoid falling into the trap of earlier modelling exercises during the COVID-19 pandemic, lessons need to be learned about how to present the results openly in ways that foster debate amongst fellow scientists, the public and politicians.

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This article first appeared on The University of Manchester [Policy Blogs](#).







# How has coronavirus changed cities?

## Using urban data to understand lockdown

James Evans, Dave Topping, Tom Bannan, Joe Rees, Ettore Murabito, Ann Gledson, Matthew Harrison

What would happen if we could remove cars from our cities? Can we improve air quality to reduce vulnerability to Coronavirus? These are big questions with massive ramifications for public health, liveability and climate change. This post uses urban data to examine how Coronavirus has transformed the movement of people in cities, and what the impacts tell us about living in cities with fewer cars.

Urban data is more available and important than ever before and has become critical to everyone living in and managing cities. Thanks to the explosion in low-cost sensors and smart technology, many organisations now have sophisticated monitoring capabilities that enable them to capture data relating to traffic, air quality, pedestrian movements and noise. The Coronavirus emergency has also prompted large data holders like Google and Apple to open up their phone location data to help control the virus. These kinds of data have huge potential to understand and plan urban environments more effectively. Our work as part of the [Manchester Urban Observatory](#) has been funded by the government for exactly this reason.

The first and most obvious role for data is to paint a picture of how lockdown has changed people's movements.

Figure 1 uses newly released Google data taken of phone locations to show changes in time spent by people in certain types of places over the course of March. For comparison, the left shows data for the Greater Manchester region, while that on the right shows data for Tyne and Wear. The zero point on the y-axis is the baseline, below which points represent the relative decrease in time spent. The government lockdown on the 23rd March is clearly shown by the rapid decrease in the time spent everywhere except for people's homes. The pattern in both regions is extremely similar, indicating uniform levels of acceptance of the lockdown which is useful to policy-makers trying to track the effectiveness of lockdown measures. The exception is time spent in parks, which was far higher in the North East in the run-up to lockdown, which may reflect the sunnier weather experienced in the North East during this period, the accessibility of greenspace or cultural differences in the use of greenspace. Here urban data is valuable in highlighting patterns but requires further study to be understood.

Changes in the movements of people also created a significant decrease in car use, with data taken from Transport for Greater Manchester indicating that roads across Greater Manchester experiencing a drop of 50-80% in traffic.

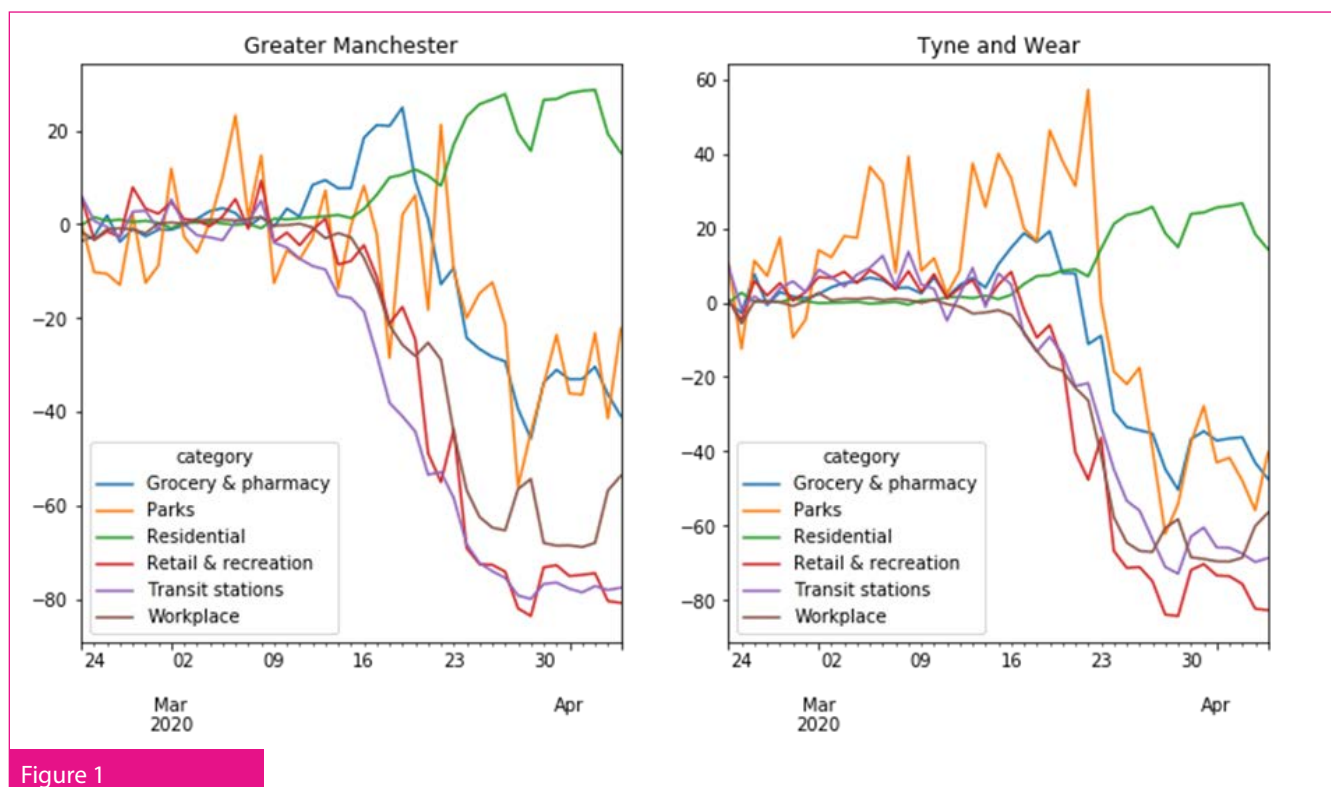


Figure 1



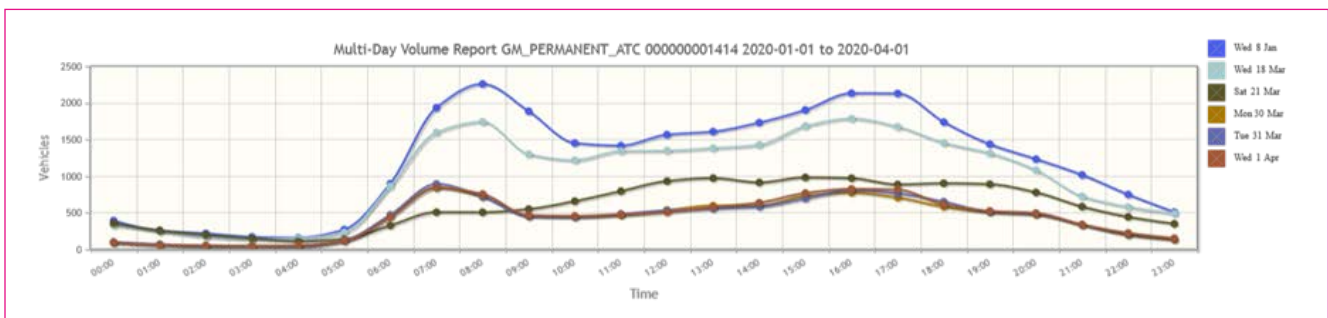


Figure 2

Figure 2 shows the number of vehicles travelling along the A34 past the University of Manchester for selected weekdays from January to April 2020. Under normal conditions (blue line) the road carries more than 1500 vehicles per hour for the entire day between 7am and 7pm, roughly equivalent to one every two seconds. After lockdown (red line) this fell by about two thirds.

This section of the A34 runs past major residential areas and presents an interesting natural experiment concerning the impacts of reducing traffic on air quality. Air quality readings are hugely influenced by weather conditions, so this requires a predictive model that can account for what air quality levels would normally have been like in the absence of lockdown. Figure 3 shows actual diurnal levels of

NO<sub>2</sub>, Nitrogen Dioxide, in micrograms per cubic metre ( $\mu\text{g}\cdot\text{m}^{-3}$ ) measured in Manchester Piccadilly for March [top row] and April [bottom row] this year, compared against levels observed from the same months between 2015 until now. NO<sub>2</sub> primarily gets in the air from the burning of fuel and thus forms from emissions from the transport sector in the UK.

The impact of weather on levels of pollution can be significant. Whilst we did witness a change in conditions from somewhat stagnant to brisk northerly flows from the 27th onwards, the significant drop in the midday levels in April is supported by the change in traffic levels during those periods. Particulate matter, or PM, can be a complicated product to interpret.

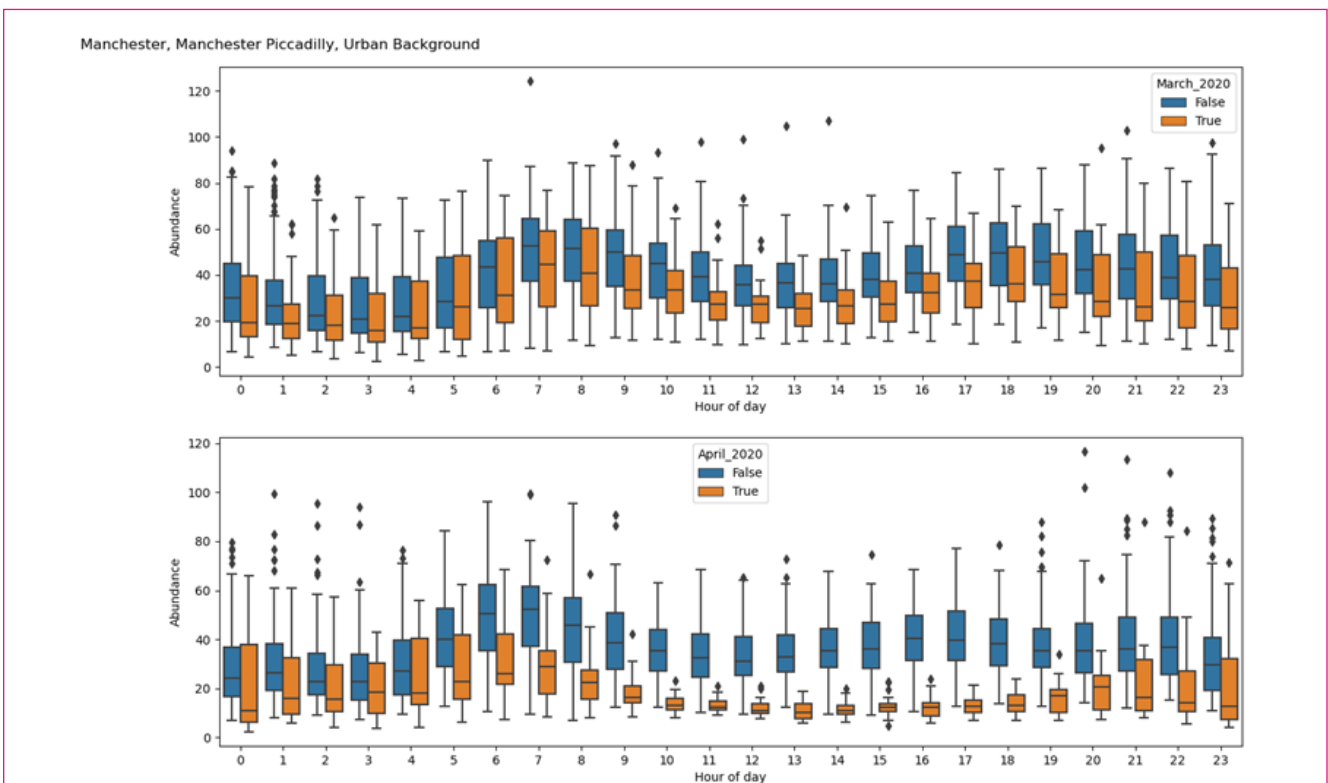


Figure 3

Manchester, Manchester Piccadilly, Urban Background

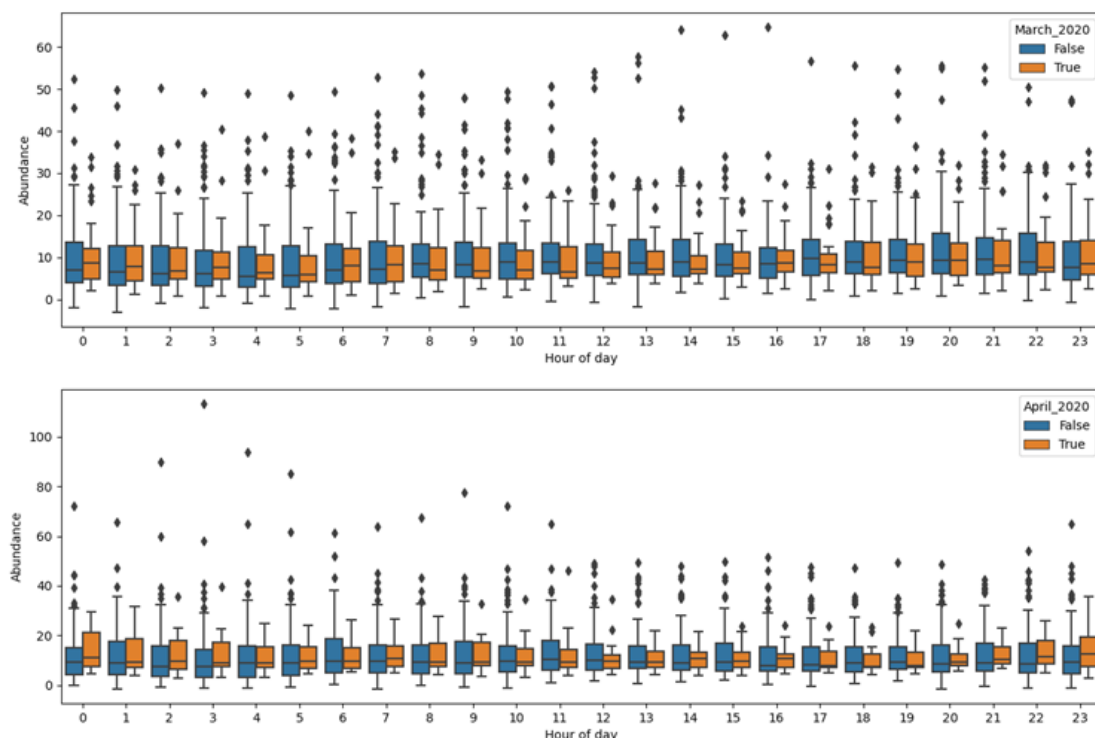


Figure 4

For example, Figure 4, a diurnal plot of PM<sub>2.5</sub>, or the mass of particulate matter smaller than 2.5 microns, shows barely any change in loadings from March and April this year compared to the past 5 years.

Whilst traffic does contribute some PM to measured mass loadings, these particles are rather small and PM is also composed material from other primary and secondary sources. Indeed, in urban environments, road vehicles are the major source of ‘ultra-fine particle’ emissions, classified as smaller than 100nm, or 0.1 microns. The [Manchester Urban Observatory](#) is investing in technology for monitoring both size and number concentrations so we can extract important source contribution detail lost in PM<sub>2.5</sub> metrics. Unravelling source and process contributions to PM is important. In theory, unintended side effects of changes in personal behaviour as a result of the lockdown may offset some of the benefits in NO<sub>x</sub> reductions. For example, the reduction in municipal collections of garden waste might have increased the amount of burning taking place, while the increased occupation of homes could have increased the use of log burners. Both of these activities could generate significant amounts of PM<sub>2.5</sub>. Unintended changes like these show the importance of being able to look at data from different sources to understand what is

happening. Again, weather conditions play a significant role in determining the source and process contributions to the PM we are exposed to.

Looking at other variables connected to traffic provides a way around this. The graph below shows data taken from a noise meter in Ardwick placed alongside Brunswick Street. The [Manchester Urban Observatory](#) has been working with residents to help understand key problems that impact their quality of life as part of the [LOOPER](#) project. For residents in this area, it was the quantity of traffic passing along this street causing noise and safety issues. The World Health Organisation has identified noise as a key determinant of quality of life, impacting mental health and the educational achievement levels of children in particular.

These kinds of data have huge potential to understand and plan urban environments more effectively.



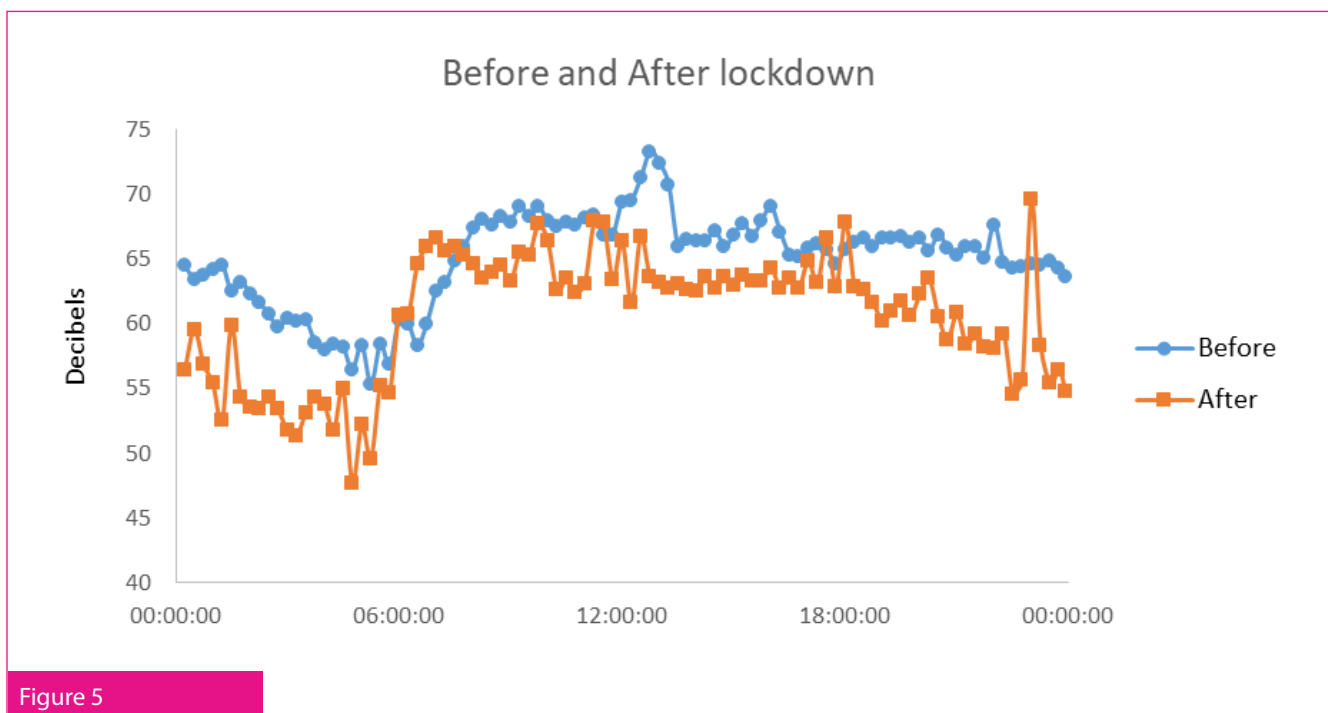


Figure 5

Figure 5 plots the average Monday against the Monday following lockdown, as well as showing the noise limit defined by the World Health Organisation as 'annoying' (thin blue line). Data suggests that the street is 5-10 decibels quieter following the lockdown on the 23rd March, and removed all peaks above 70dB, which is the level at which hearing can start to be damaged by prolonged exposure. The benefits of lower noise levels are significant for mental health, which is increasingly critical for especially disadvantaged populations under lockdown. Data from our traffic cameras on the same street confirmed that the spike on the orange line just before midnight is associated with a speeding driver.

The Coronavirus lockdown has transformed human activities and urban data can help show how. The lockdown produces insights into the potential benefits of clean air schemes to reduce the number of private cars in cities. A 2018 report by Kings University identified that reducing PM2.5 and NOX by one third in Greater Manchester would add 3.5 months on to every single person's life expectancy and save the region £500m per year. The lockdown has reduced NO2 pollution levels by more like a half, and the value of cleaner air is increasing given the proven link between air pollution and vulnerability to Coronavirus. Urban data can also be used to assess the effectiveness of lockdown measures in terms of reducing interactions in specific types of places. Work at our sister [Urban](#)

[Observatory in Newcastle](#) has also shown how Artificial Intelligence can interpret data from cameras to identify places where social distancing is not being practised. By capturing movements around the city urban data can help decision-makers understand how to manage Coronavirus transmission more effectively, focusing on specific areas. To make this a reality privacy must be respected, corporately owned data must be opened up, and resource must be directed to synthesise the mountain of existing data into intelligence that can be used by governments. GDPR covers the first of these challenges. Coronavirus and public opinion are shifting the second. The real challenge is the third one, and it is surely where universities have a critical role to play.

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